

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

AMENDMENT

In The Claims:

1. (currently amended) A flip chip light-emitting diode package, comprising:
 - a Schottky diode comprising; and
 - a submount having a first surface and a second surface;
 - an ohmic contact layer, disposed on a portion of the first surface and the second surface of the submount; and
 - a Schottky contact layer, disposed on a portion of the first surface of the submount and electrically contacts with the submount, wherein the ohmic contact layer and the Schottky contact layer are electrically isolated; and
 - a light-emitting diode, disposed on the Schottky diode by flip-chip bonding process, wherein the light-emitting diode and the Schottky diode are connected reverse and in parallel.
2. (original) The flip chip light-emitting diode package of claim 1, wherein the package further comprises a plurality of solder bumps disposed between the Schottky diode and the light-emitting diode so that the Schottky diode and the light-emitting diode are connected reverse and in parallel.
3. (original) The flip chip light-emitting diode package of claim 1, wherein the light-emitting diode further comprises:
 - a substrate;

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

a semiconductor layer, disposed on the substrate, wherein the semiconductor layer at least comprises a first conductive type doped semiconductor layer, a second conductive type doped semiconductor layer and a light-emitting layer, and the light-emitting layer is disposed on the first conductive type doped semiconductor layer and the second conductive type doped semiconductor layer is disposed on the light-emitting layer;

a first electrode, disposed on the first conductive type doped semiconductor layer; and
a second electrode, disposed on the second conductive type doped semiconductor layer.

4. (original) The flip chip light-emitting diode package of claim 3, wherein material forming the first electrode is selected from a group consisting of Ti/Al, Cr/Au, Cr/Pt/Au, Cr/Pd/Au and Cr/Ti/Au.

5. (original) The flip chip light-emitting diode package of claim 3, wherein material forming the second electrode is selected from a group consisting of Ni/Au, Pd/Au, Pt/Au, Ti/Au, Cr/Au, Sn/Au and Ta/Au.

6. (original) The flip chip light-emitting diode package of claim 3, wherein the second electrode comprises an N-type transparent conductive oxide layer or a P-type transparent conductive oxide layer.

7. (original) The flip chip light-emitting diode package of claim 3, wherein material constituting the N-type transparent conductive oxide layer comprises ITO or CTO.

8. (original) The flip chip light-emitting diode package of claim 3, wherein material constituting the P-type transparent conductive oxide layer comprises CuAlO₂ or SrCu₂O₂.

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

Claim 9. (canceled)

10. (currently amended) The flip chip light-emitting diode package of claim 9 1, wherein the submount comprises an N-doped material.

11. (currently amended) The flip chip light-emitting diode package of claim 9 1, wherein the submount comprises a P-doped material.

12. (currently amended) The flip chip light-emitting diode package of claim 9 1, wherein material forming the submount is selected from a group consisting of Si, GaAs, GaP, GaN and ZnO.

13. (currently amended) The flip chip light-emitting diode package of claim 9 1, wherein material forming the ohmic contact layer comprises aluminum (Al).

14. (currently amended) The flip chip light-emitting diode package of claim 9 1, wherein material forming the Schottky contact layer is selected from a group consisting of titanium (Ti), nickel (Ni), gold (Au), tungsten (W), silver (Ag) and platinum (Pt).

15. (currently amended) A flip chip light-emitting diode package, comprising:
a Schottky diode group having a plurality of Schottky diodes, wherein the Schottky diodes are electrically connected in series, in parallel or in series and parallel together, each of the Schottky diodes comprises: ; and
a submount having a first surface and a second surface;
an ohmic contact layer, disposed on a portion of the first surface and the second surface of the submount;

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

a Schottky contact layer, disposed on a portion of the first surface of the submount and electrically contacts with the submount, wherein the ohmic contact layer and the Schottky contact layer are electrically isolated; and

a light-emitting diode disposed on one of the Schottky diodes by flip-chip bonding process, wherein the light-emitting diode and the Schottky diode group are connected reverse and in parallel.

16. (original) The flip chip light-emitting diode package of claim 15, wherein the package further comprises a plurality of solder bumps disposed between one of the Schottky diodes and the light-emitting diode so that the Schottky diode and the light-emitting diode are connected reverse and in parallel.

17. (original) The flip chip light-emitting diode package of claim 15, wherein the light-emitting diode further comprises:

a substrate;
a semiconductor layer, disposed on the substrate, wherein the semiconductor layer at least comprises a first conductive type doped semiconductor layer, a second conductive type doped semiconductor layer and a light-emitting layer, and the light-emitting layer is disposed on the first conductive type doped semiconductor layer and the second conductive type doped semiconductor layer is disposed on the light-emitting layer;

a first electrode, disposed on the first conductive type doped semiconductor layer; and
a second electrode, disposed on the second conductive type doped semiconductor layer.

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

18. (original) The flip chip light-emitting diode package of claim 17, wherein material forming the first electrode is selected from a group consisting of Ti/Al, Cr/Au, Cr/Pt/Au, Cr/Pd/Au and Cr/Ti/Au.

19. (original) The flip chip light-emitting diode package of claim 17, wherein material forming the second electrode is selected from a group consisting of Ni/Au, Pd/Au, Pt/Au, Ti/Au, Cr/Au, Sn/Au and Ta/Au.

20. (original) The flip chip light-emitting diode package of claim 17, wherein the second electrode comprises an N-type transparent conductive oxide layer or a P-type transparent conductive oxide layer.

21. (original) The flip chip light-emitting diode package of claim 17, wherein material constituting the N-type transparent conductive oxide layer comprises ITO or CTO.

22. (original) The flip chip light-emitting diode package of claim 17, wherein material constituting the P-type transparent conductive oxide layer comprises CuAlO₂ or SrCu₂O₂.

Claim 23. (canceled)

24. (currently amended) The flip chip light-emitting diode package of claim 23 15, wherein the submount comprises an N-doped material.

25. (currently amended) The flip chip light-emitting diode package of claim 23 15, wherein the submount comprises a P-doped material.

Customer No.: 31561
Docket No.: 12119-US-PA
Application No.: 10/710,421

26. (currently amended) The flip chip light-emitting diode package of claim 23 15, wherein material forming the submount is selected from a group consisting of Si, GaAs, GaP, GaN and ZnO.

27. (currently amended) The flip chip light-emitting diode package of claim 23 15, wherein material forming the ohmic contact layer comprises aluminum (Al).

28.(currently amended) The flip chip light-emitting diode package of claim 23 15, wherein material forming the Schottky contact layer is selected from a group consisting of titanium (Ti), nickel (Ni), gold (Au), tungsten (W), silver (Ag) and platinum (Pt).